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13. ABSTRACT *(Maximum 200 words)*
The project goals are the synthesis of new materials having the potential for use as ion-conducting membranes. We have been able to make rugged membrane structures from a polymer of interest by first casting the polymer on a surface then exposing it to UV irradiation. These procedure generates free standing membranes that are quite durable in themselves. The initial goal has been to investigate the use of unsaturated carbosilane monomer functionalized with an Si-Cl bond in the synthesis of new materials for use as ion-conducting membranes. We've spent most of our time devising the synthesis chemistry needed to create chlorosilane monomers substituted with appropriate nucleophiles. The nucleophiles employed thus far have been diethylene glycol methyl ether and the sodium salt of 3-hydroxy-1-propane-sulfonic acid.

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   K.R. Brzezinska, Postdoctoral Associate
   K. B. Wagener, Professor of Chemistry
   J.R. Reynolds, Professor of Chemistry

9. **REPORTS OF INVENTIONS BY TITLE:** None

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FINAL PROGRESS REPORT

Description of the research problem studied. Our work is related to the synthesis of new materials having the potential for use as ion-conducting membranes (Figure 1). These materials should be impermeable to methanol penetration or crossover; they should be able to transport protons with relative ease and they should have a high ion conductivity.

Summary of the most important results. The project goals are to investigate the use of unsaturated carbosilanes functionalized with a Si-Cl bond in the synthesis of new materials having the potential for use as ion-conducting membranes (Figure 1).

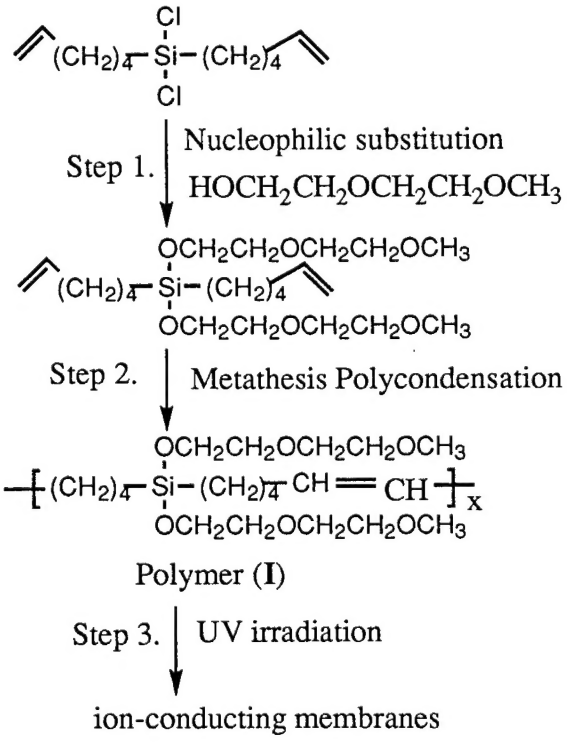

Figure 1. The synthesis of new materials having the potential for use as ion-conducting membranes.

We have been able to make rugged membrane structures from a polymer (**I**) by first casting the polymer on a surface then exposing it to UV irradiation. This procedure generates free standing membranes that are quite durable in themselves.

We've spent most of our time devising the synthesis chemistry needed to create chlorosilane monomers substituted with appriopriate nucleophiles. The nucleophiles employed thus far have been diethylene glycol methyl ether and the sodium salt of 3-hydroxy-1-propane sulfonic acid. First the backbone monomer, dichlorodihexenylsilane (made for Doug Kiserow's elastomer project) was synthesized via hydrosilation chemistry. Nucleophilic substitution then was done on this monomer with the diethylene glycol methyl ether nucleophile (step 1, Figure 1). ADMET polymerization followed to give a highly viscous oil (step 2, Figure 1) and this oil was then converted into a membrane as described above (cast on surface, UV irradiation).

Nuclephilic substitution on the Si-Cl bond in the carbosilane monomer with sodium salt of 3-hydroxy-1-propane sulfonic acid produced a solid. This product was insoluble in organic solvents (toluene, chloroform) but soluble in DMF or DMSO. Substitution on the Si-Cl bond in the dichloro-carbosilane polymer with sodium salt of 3-hydroxy-1-propane sulfonic acid produced material insoluble in virtually every solvent system studied.

List of all publications and technical reports: None.

Scientific personnel supported by this project and degrees awarded during this period.

K.R. Brzezinska, Postdoctoral Associate
K.B. Wagener, Professor of Chemistry
J.R. Reynolds, Professor of Chemistry

Reports of invention by title. None.

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